

ABSTRACT

5 A technique for net shaping gear teeth of a high performance power transmission gear from a powder metal workpiece includes heating a powder metal workpiece in the form of a near net shaped gear blank having gear teeth surfaces above its critical temperature to obtain an austenitic structure throughout its surfaces, isothermally quenching the workpiece at a rate greater than the critical cooling rate of its surfaces to a uniform metastable austenitic temperature just above the martensitic transformation temperature, rolling the gear teeth surfaces of the workpiece to a desired outer peripheral profiled shape between opposed dies, each die having an outer peripheral profiled surface, while holding the workpiece at the uniform metastable austenitic temperature, the gear teeth surfaces undergoing densification, plastic deformation, and strengthening as a result of the rolling operation, and cooling the workpiece through the martensitic range to thereby harden the surfaces of the gear teeth.

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